

## Egg Drop Engineering Challenge

Participants will design and build an apparatus that will protect an egg from breaking as it freefalls from a height of approximately 11 feet.

### Materials/Parameters

1. The apparatus may be constructed of any material except metal, glass or other shatterable material (for safety reasons). Failure to use approved materials will result in automatic disqualification.
2. The apparatus (without the egg) shall not exceed 250.0 grams (0.25 kg) in mass. Apparatus weighing more than 250.0 grams will result in automatic disqualification.
3. The apparatus must fit completely inside of a 20 cm x 20 cm x 20 cm box. Apparatus that do not fit in within the prescribed space will result in automatic disqualification.
4. The apparatus must freefall without contacting team members, other persons or objects; no strings, chutes, etc. may be used. Tethers, parachutes and other air resistance devices are prohibited.
5. Containers must be designed so that the egg may be inserted easily before competing, and easily checked after the drop test.
6. The egg must stay inside the apparatus throughout the drop test.
7. Unique and innovative design will be an important part of the competition. A "minimum dimension" measurement will be used.

**Note:** To determine the "minimum dimension," participants will place their apparatus on a flat horizontal surface in whatever orientation they choose. The judge will measure from the ground to the highest point on the device while the measurement is occurring. After the measurement, the device may not be modified before the drop.

### Egg

The egg will be provided by the judge at the time of the competition. It will be a grade A raw egg. Any manipulation of the egg to alter its physical properties will result in automatic disqualification.

### Height of Drop

The apparatus will be dropped by the teacher from a height of approximately 5 meters

### Judging

- The apparatus must allow for the egg provided to be unbroken and uncracked upon completion of the drop test. Participants will remove the egg from the apparatus and show it to the judge for verification. Only the judge determines whether the egg survived the drop test.
- The distance from the center of the target to the closest edge of the apparatus will be measured and recorded after the apparatus comes to rest.
- The apparatus will be judged based on the following equation, with the highest score winning:  
**SCORE = Integrity / (Mass + Height)**  
**Integrity** = 2010 if the egg is not broken; 0 if it is broken  
**Mass** = Mass (in grams) of the container without the egg (must not exceed 250 grams)  
**Height** = Height (in centimeters) of the container's "minimum dimension" (see No. 7 under 'Materials/Parameters')

$F = m \times a \times (h/s)$  where  $s$  is compaction  $\rightarrow$  compaction=1 and where  $a$  is the acceleration of gravity on earth

Names of Group Members: \_\_\_\_\_

Brief Description of Idea:

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Materials Used (please list materials brought even if all were on used):

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Mass of the "final" device: \_\_\_\_\_ grams      \_\_\_\_\_ kilograms

Estimated force (F) of Impact at 5 meters: \_\_\_\_\_ Newtons

Estimated force of Impact at 25 meters: \_\_\_\_\_ Newtons

Results of Egg Drop:

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Ideas for Improving the Device:

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Sketch of the "final" device: